



Service Manual

Quartz PLL DIRECT DRIVE 2-motor

FULL AUTOMATIC TURNTABLE

PL-560

 **PIONEER®**

For details of operation of the mechanism and electronic circuitry of the PL-560, refer to the manuals listed below.

1. Operation of mechanism PL-520
2. Operating principle of phono-motor PL-630

MODEL PL-560 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KCT	120V only	Canada model (without cartridge)
KUT	120V only	U.S.A. model (without cartridge)
HGT	220V and 240V (switchable)	Europe or Oceania model (without cartridge)
ST	110V, 120V, 220V and 240V (switchable)	General export model (without cartridge)
S/G	110V, 120V, 220V and 240V (switchable)	U.S. Military model (within cartridge)

- This service manual is applicable to the PL-560/KUT, KCT. For servicing of the other types please refer to the additional service manuals.

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1. SPECIFICATIONS

Motor and Turntable

Drive System Direct-drive
 Motor Quartz PLL Hall motor
 Turntable Platter . . . 320mm diam. aluminum alloy die-cast
 Moment of Inertia 280kg·cm² (including platter mat)
 Speeds 33-1/3 and 45rpm
 Speed Control Range ±6%
 Wow and Flutter Less than 0.025% (WRMS)
 Signal-to-Noise Ratio More than 73dB (DIN-B)
 (with Pioneer cartridge model PC-400)

Rotational Characteristics

Build-up Time Within 120° rotation at 33-1/3rpm
 Speed Deviation Less than 0.002%
 Speed vs. Load Characteristics Stable up to 200 grams
 drag load
 Speed Drift Less than 0.00008%/h at 33-1/3rpm
 Less than 0.00003%/degree temp. change at 33-1/3rpm

Tonearm

Type Static-balance type, S-shaped pipe arm
 Effective Arm Length 221mm
 Overhang 15.5mm
 Usable Cartridge Weight 4g (min.) to 10g (max.)

Subfunctions

Full auto mechanism
 Anti-skating force control
 Stylus pressure direct-readout counter weight

Cueing device
 Strobe light
 Pitch indicator
 Free stop hinges

Semiconductors

ICs 4
 Transistors 7
 Diodes 5
 Hall elements 3

Accessories

EP Adaptor 1
 Screwdriver 1
 Cartridge mounting screws 6
 Cartridge mounting nuts 2
 Cartridge mounting washers 2
 Operating instructions 1

Miscellaneous

Power Requirements AC 120V, 60Hz
 Power Consumption 12W
 Dimensions 440(W) x 145(H) x 365(D) mm
 17-15/16(W) x 5-11/16(H) x 14-3/8(D) in.
 Weight 10.5kg/23lb 2 oz

NOTE:

Specifications and design subject to possible modification without notice, due to improvements.

2. FRONT PANEL FACILITIES

① CUT BUTTON

Push this button to stop the record play. When pushed, the tonearm will rise and return to the arm rest. The power to the turntable will then be switched off and a few seconds later, the platter will stop rotating.

NOTE:

If the REPEAT button is pushed, the tonearm will return to the arm rest and then move across again to the record.

② REPEAT BUTTON

Push this button when you want to listen to the same record again. Press the button once more to release.

NOTE:

All you have to do for repeat play is to press the REPEAT button. There is no need to push the START button again.

③ START BUTTON

The power to the turntable is turned on and the platter starts to rotate when this button is depressed.

④ SPEED SELECT SWITCH

45 When this switch is depressed, the platter will rotate at 45rpm. Depress for playing 45rpm records, singles or EP's.

33 When this switch is set to the released position, the platter will rotate at 33-1/3rpm. Release for playing 33-1/3rpm records like LP's.

⑤ QUARTZ LOCK SWITCH/PITCH CONTROL KNOB

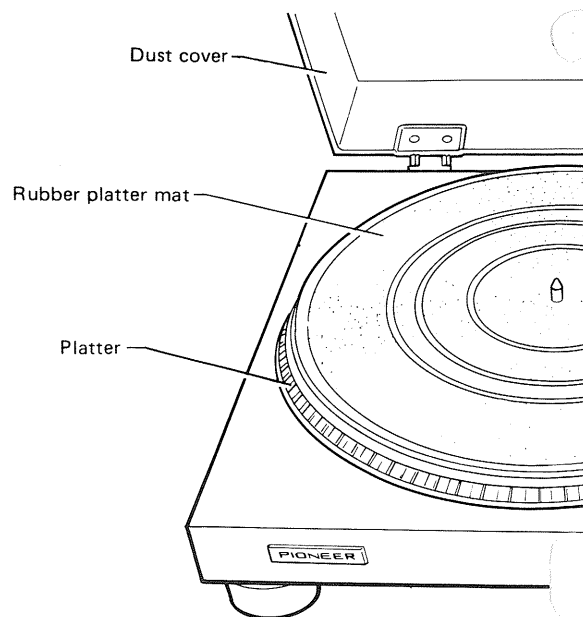
- When the Quartz LOCK switch is pushed downward, the Quartz PLL will actuate and the strobe light comes on. Normally use it in this position.

The turntable will rotate at the precisely rated speed according to the SPEED SELECT switch.

- When the Quartz LOCK switch is pulled upward, the Quartz PLL will be released and the strobe light goes off and pitch meter lamp will light up.

If the PITCH CONTROL knob is turned at this position, the rotating speed of the turntable will be adjusted up to 6% faster or slower than its rated speed. If the knob is turned in the (+) direction, the turntable rotates faster, and if the knob is turned in the (–) direction, the turntable rotates slower than its rated speed. The variation of the rotating speed can be read out on the PITCH METER.

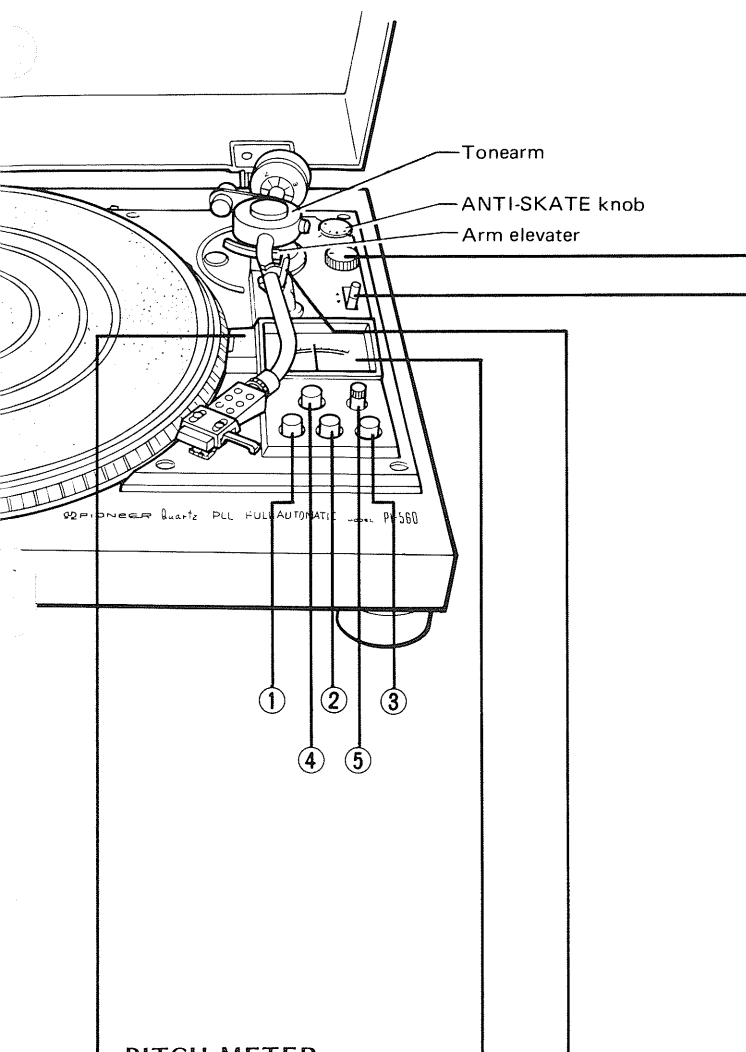
(Refer to "PITCH CONTROL")



PITCH CONTROL

In normal circumstances, the platter rotates at the rated speed when the Quartz LOCK switch is kept at ON. If you want to vary the speed, set this switch to OFF and turn the PITCH CONTROL knob. If the platter rotates faster than its rated speed, the musical intervals of the reproduced sound will become higher, and if it rotates slower, they will become lower.

Nowadays, there are slight variations in the orchestra and other tuning sounds recorded on discs. Furthermore, pianos and other musical instruments for the home are tuned to high international standards and so there are slight discrepancies in the musical intervals when practicing on the piano along with a record. This turntable features a pitch control which allows you to compensate for the slight variations in the musical intervals by making the platter rotate up to 6% faster or slower than its rated speed. The compensation can be checked by ear. An adjustment of $\pm 6\%$ is equivalent to about a semitone.



RECORD SIZE SELECTOR

This selector selects the size of the record for automatic play and also selects manual play.

17 7" For the automatic play of 17cm (7-inch) LP and EP records.

25 10" For the automatic play of 25cm (10-inch) LP records.

30 12" For the automatic play of 30cm (12-inch) LP records.

MANUAL . . . For the manual play of records.

NOTE:

The tonearm will not be actuated when the RECORD SIZE selector is at the MANUAL position for play, even if the START button and the REPEAT button are pushed.

ARM ELEVATION LEVER

This lever controls the ascent and descent of the tonearm.

▲ (UP) The tonearm rises.

▼ (DOWN) . . . The tonearm descends gently.

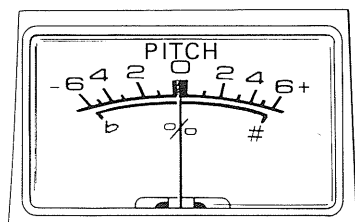
Set to this position for auto play, auto repeat and other automatic operations.

NOTE:

When the ARM ELEVATION lever is set to the UP position for automatic play, the tonearm will move over as far as the lead-in groove on the record but it will not descend and the record will therefore not be played.

PITCH METER

When the Quartz LOCK switch is set to OFF, the pitch meter lamp will light up, and the variation in the rotational speed of the platter in respect to its rating (33-1/3 or 45rpm) can be read out on the meter.

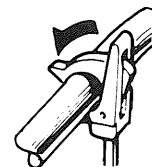


ARM REST

The arm rest supports the tonearm when it is not being used. Set the tonearm on its rest when it is not playing records. Clamp it into position if you don't have any immediate plans to play records (see Figure).



Releasing the arm clamp

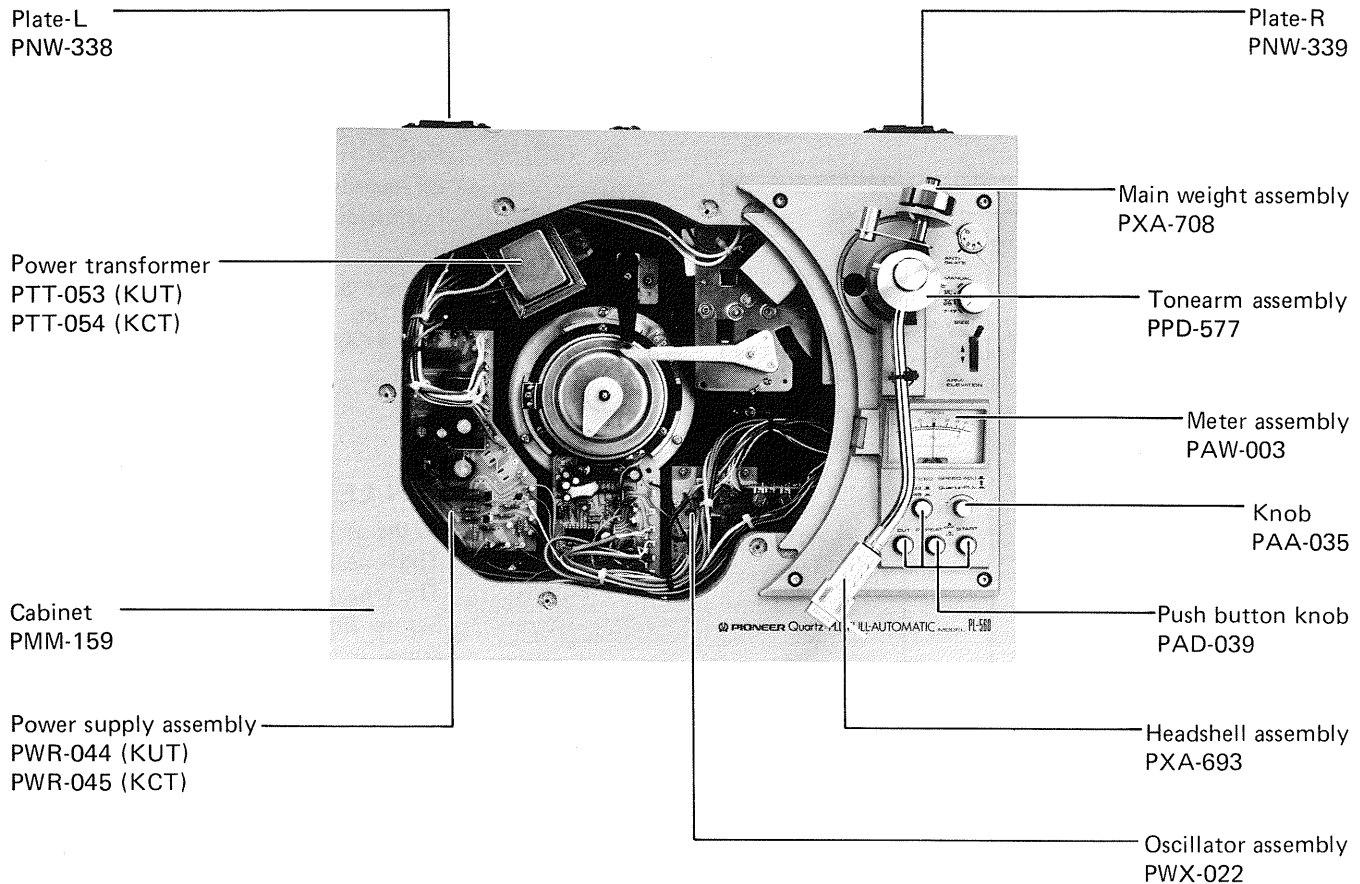


Securing the arm clamp

STROBE LIGHT

When the Quartz LOCK is set to ON, this light comes on and lights stroboscopically. Then, the turntable rotates at its rated speed and so the strobe dots remain stationary.

3. PARTS LOCATION



4. DISASSEMBLY

● Tone arm

Remove the arm base from the cabinet while referring to the disassembly drawing on Page 11.

1. Unsolder the leads coming out from the tone arm.
2. Remove the P.U. plate by loosening the two mounting screws.
3. Loosen the tone arm fixing screws using a hexagonal wrench, and then remove the tone arm.

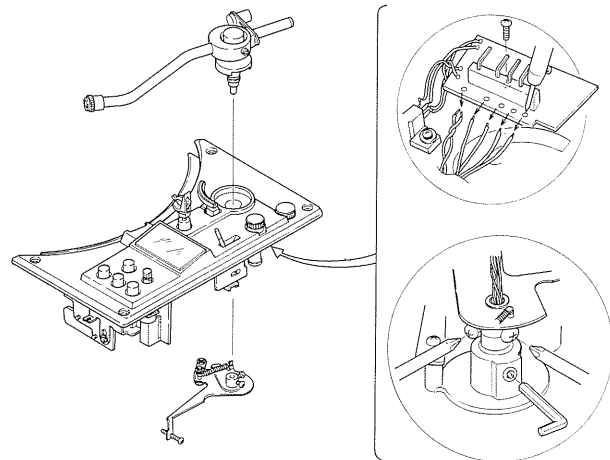


Fig. A

● **Foot spring**

Remove the spring stopper using a screwdriver, as shown in the diagram.

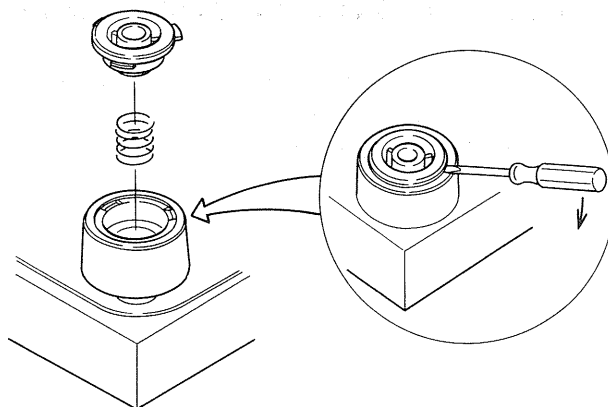


Fig. B

● **Timing motor**

1. Remove the sub-panel.
2. Remove the cam from the shaft of the gear motor.
3. Using cutting pliers, cut off the aluminium rivets securing the gear motor.
4. When reinstalling the gear motor, use two N3 nuts and PSA3x8 screw in place of the rivets cut off in 3. above.

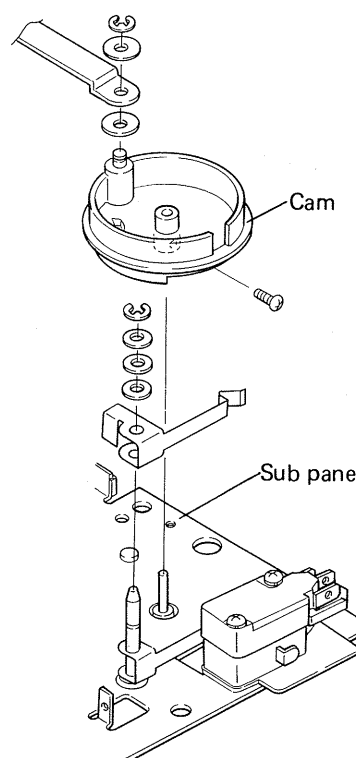


Fig. C

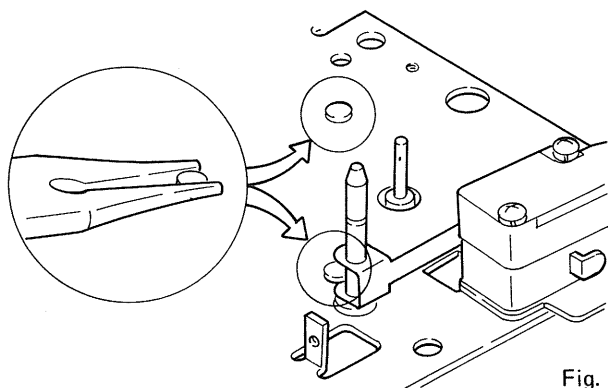


Fig. D

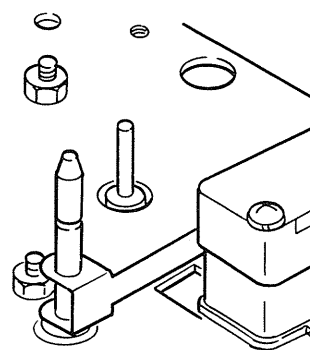


Fig. E

5. MECHANISM ADJUSTMENT

Prior to making any adjustments, check that the PU plate shaft is located in the center of the cut out section of the sub panel (as shown in Fig. 1 below).

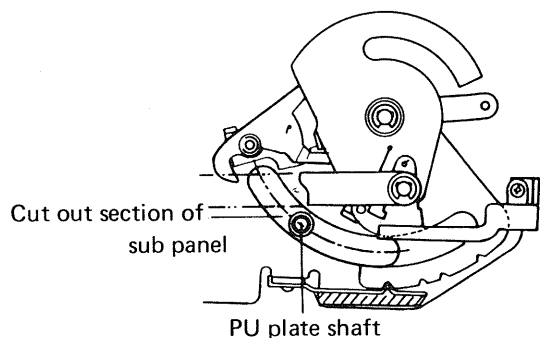


Fig. 1

Tonearm Descent Positions

The tonearm descent positions may be adjusted by turning the adjustment screws located in the panel holes at the base of the tonearm pivot (see Fig. 2).

When turned clockwise .. the descent position is center.

When turned counter clockwise the descent position is moved outwards.

This is quite a simple operation when a test record is used.

For 30cm records tonearm descent should occur in the 304 to 319 count range.

For 25cm records tonearm descent should occur in the 252 to 267 count range.

For 17cm records tonearm descent should occur in the 173 to 184 count range.

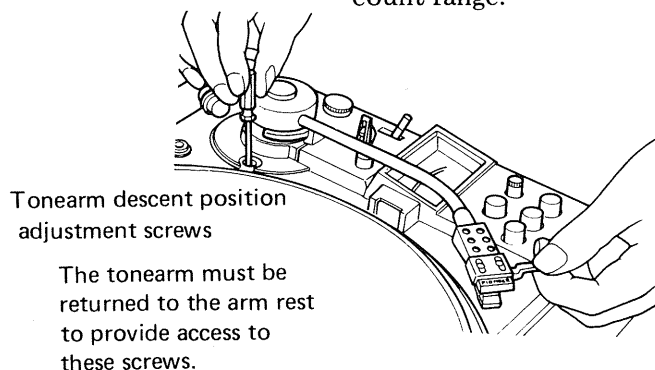
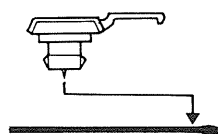


Fig. 2-a

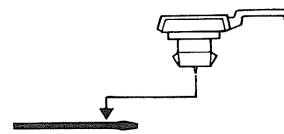
Turn adjustment screw in the counter clockwise direction



Turn adjustment screw in the clockwise direction



Descent position too far inside



Descent position too far outside

Fig. 2-b

When Tonearm Fails to Return

1. Adjust the stopper angle so that it makes contact with the return lever pin (Fig. 3).

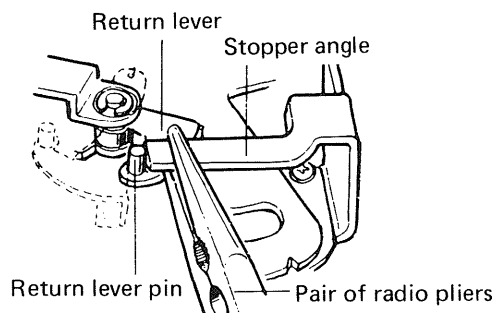


Fig. 3

Arm Elevation Adjustment

1. Leave the tonearm in the up position, and adjust the height of the arm elevation sheet so that the gap between stylus tip and record surface is about 10mm. (Fig. 4).

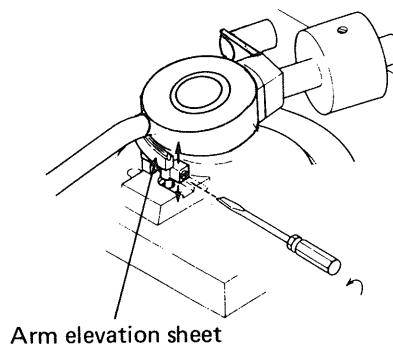


Fig. 4

Auto Return Lift Off Position

First check that the turntable pin (attached to the turntable) has not been bent over. Strighten out if necessary.

1. Tonearm lifts off too soon.

Unscrew the screw in the tip of the PU plate by a suitable amount (Fig. 5).

2. Tonearm too slow in lifting off

Screw the PU plate tip screw in further (Fig. 5).

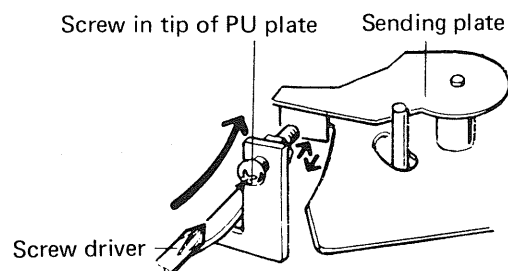


Fig. 5

Faulty Tonearm Movement

If the tonearm is interfered with, or halted altogether during the lead in operation, tighten up the screw shown in Fig. 6.

NOTE:

This adjustment screw should be made neither too tight nor too loose.

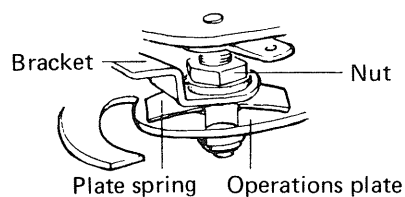


Fig. 6

Shorting Switch

Adjust the switch mounting screw so that the gap between contacts during play is 0.5mm (Fig. 7).

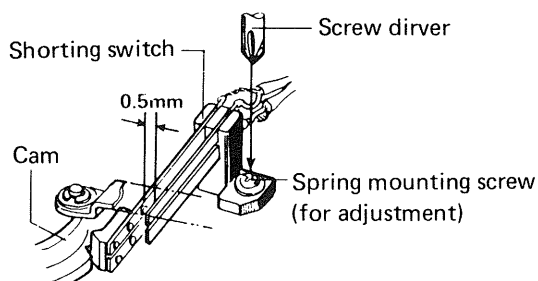


Fig. 7

6. ELECTRIC ADJUSTMENTS

6.1 SPEED ADJUSTMENT WHEN QUARTZ LOCK IS OFF

1. Put the quartz lock off.
2. Turn the ADJUST knob on the control panel to the mechanical center position.
3. Insert a screwdriver through the small hole in the baseplate of the player, and turn the semi-fixed speed adjustment potentiometer VR₁ until the strobe pattern on the turntable becomes stationary.

6.2 ADJUSTMENT OF D.D. MOTOR OPERATING POINT

● Adjustment Conditions

Connect the SP and TP23 terminals of PWG-017 to each input of a double image oscilloscope (synchroscope). Put the turntable in the Quartz Lock ON condition, and then start it up.

● Method of Adjustment

1. Observe the output waveforms from SP and TP23 (Fig. 8). (Two output pulses from terminal TP23 will correspond with one pulse from terminal SP.
2. Adjust the semi-fixed resistor in the control circuit assembly (PWG-017) so that the rising part of the pulse which comes out of terminal TP23 fits into the middle of the pulse which is generated at terminal SP. For 33-1/3 rpm, adjust VR₂₁. For 45 rpm adjust VR₂₂.

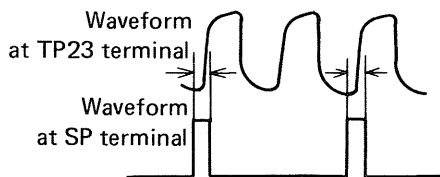


Fig. 8

6.3 METER ADJUSTMENT

● Adjustment Conditions

1. Connect a frequency counter between the TP₁ and Gnd terminals of the oscillator assembly (PWX-022).
2. Turn the speed adjust knob to its mechanical center.
3. Put the Quartz Lock off.


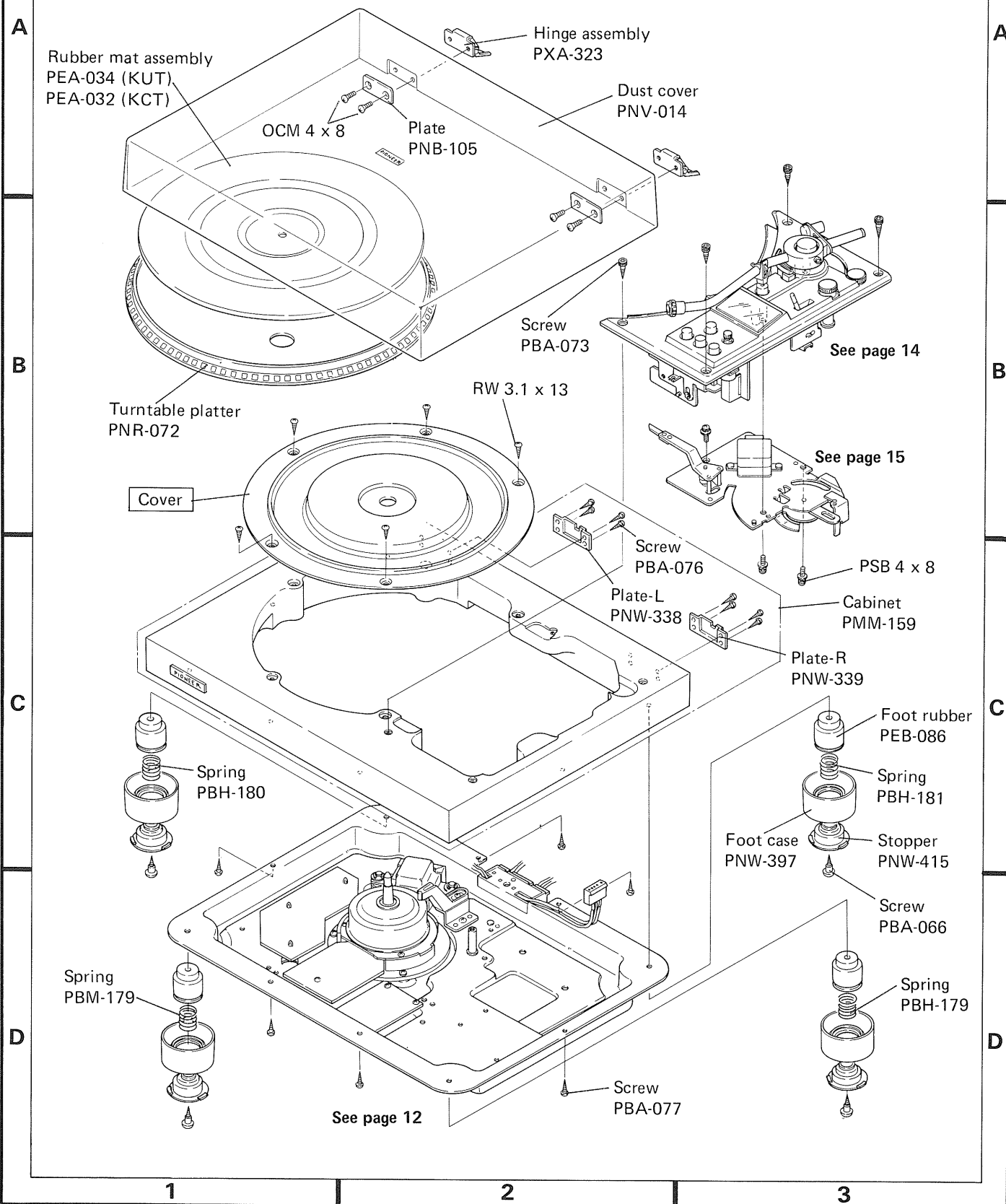
● Adjustment

1. Put the speed selector button in the "45" position.
2. Turn VR₁ in the oscillator assembly (PWX-022) until the reading on the frequency counter becomes 750.0Hz.
3. Turn VR₂ in the control assembly (PWX-028) until the meter reading becomes zero.
4. Put the speed selector button in the "33" position, and turn VR₁ until the meter reading becomes zero.
5. Turn the speed adjust knob until the reading on the frequency counter becomes 795Hz (750Hz +6%).
6. Adjust VR₃ so that the meter indication becomes +6%.

7. EXPLODED VIEWS


7.1 CABINET

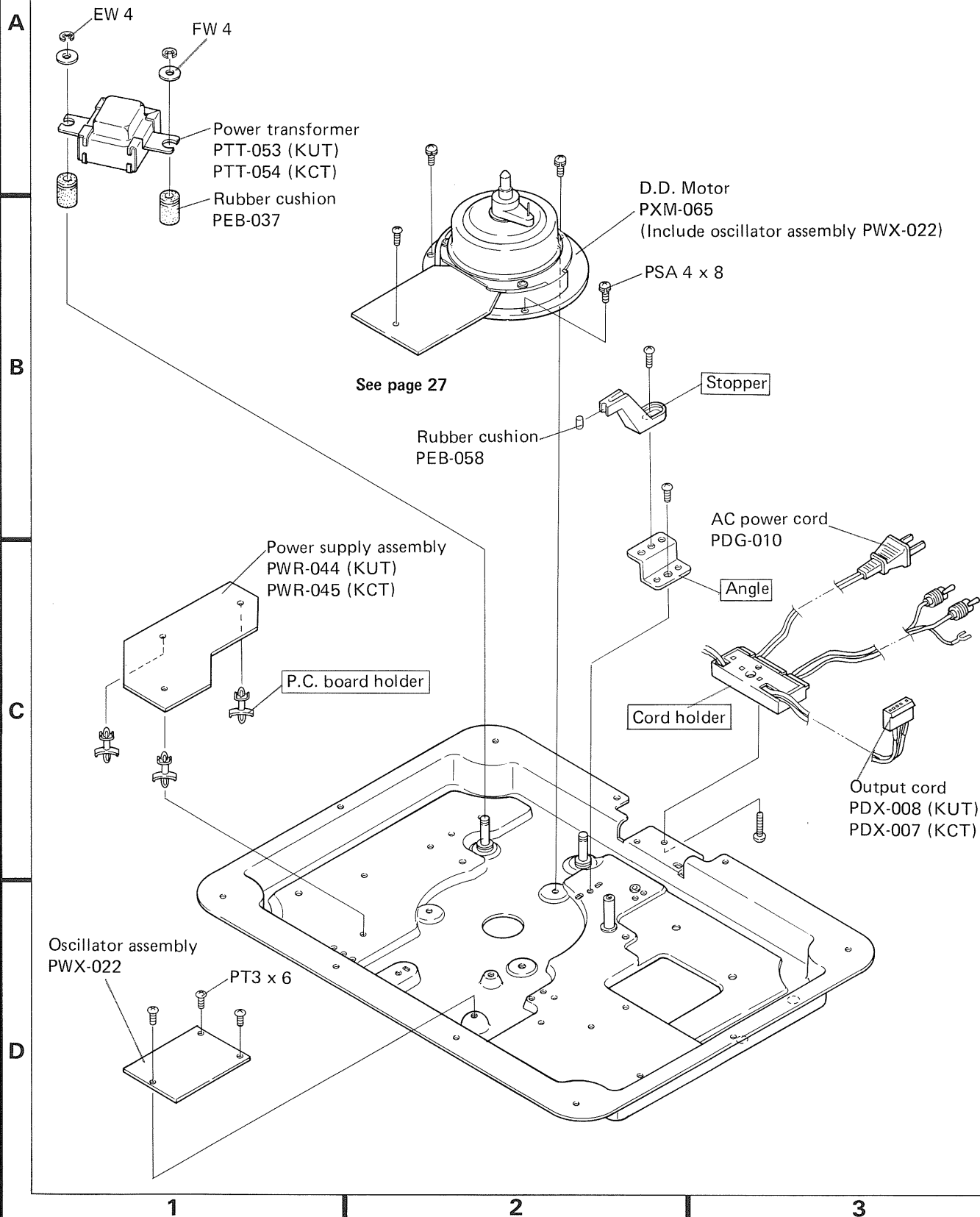
NOTE:

 marked parts cannot be supplied.



7.2 BOTTOM PLATE

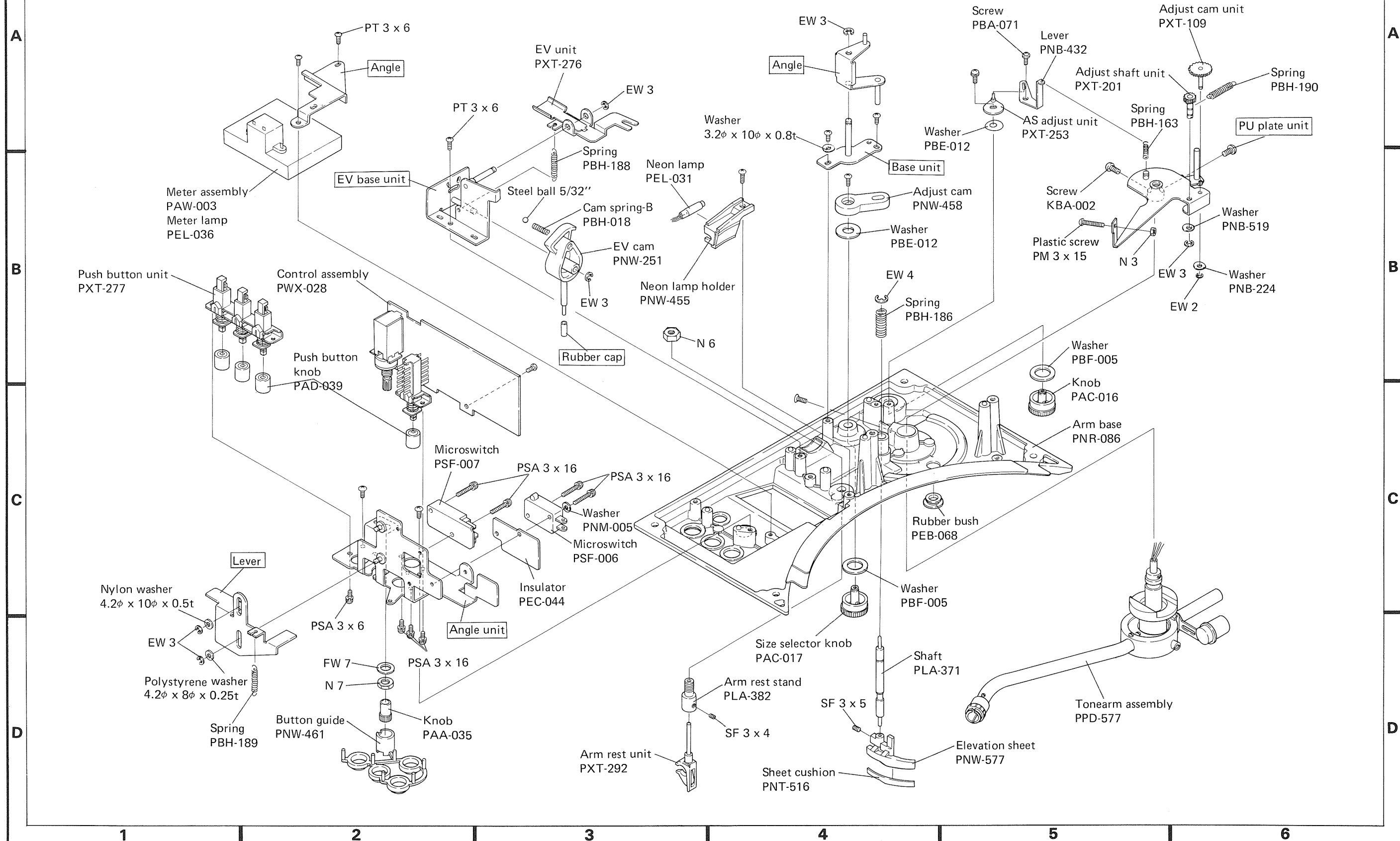
NOTE:

 marked parts cannot be supplied.



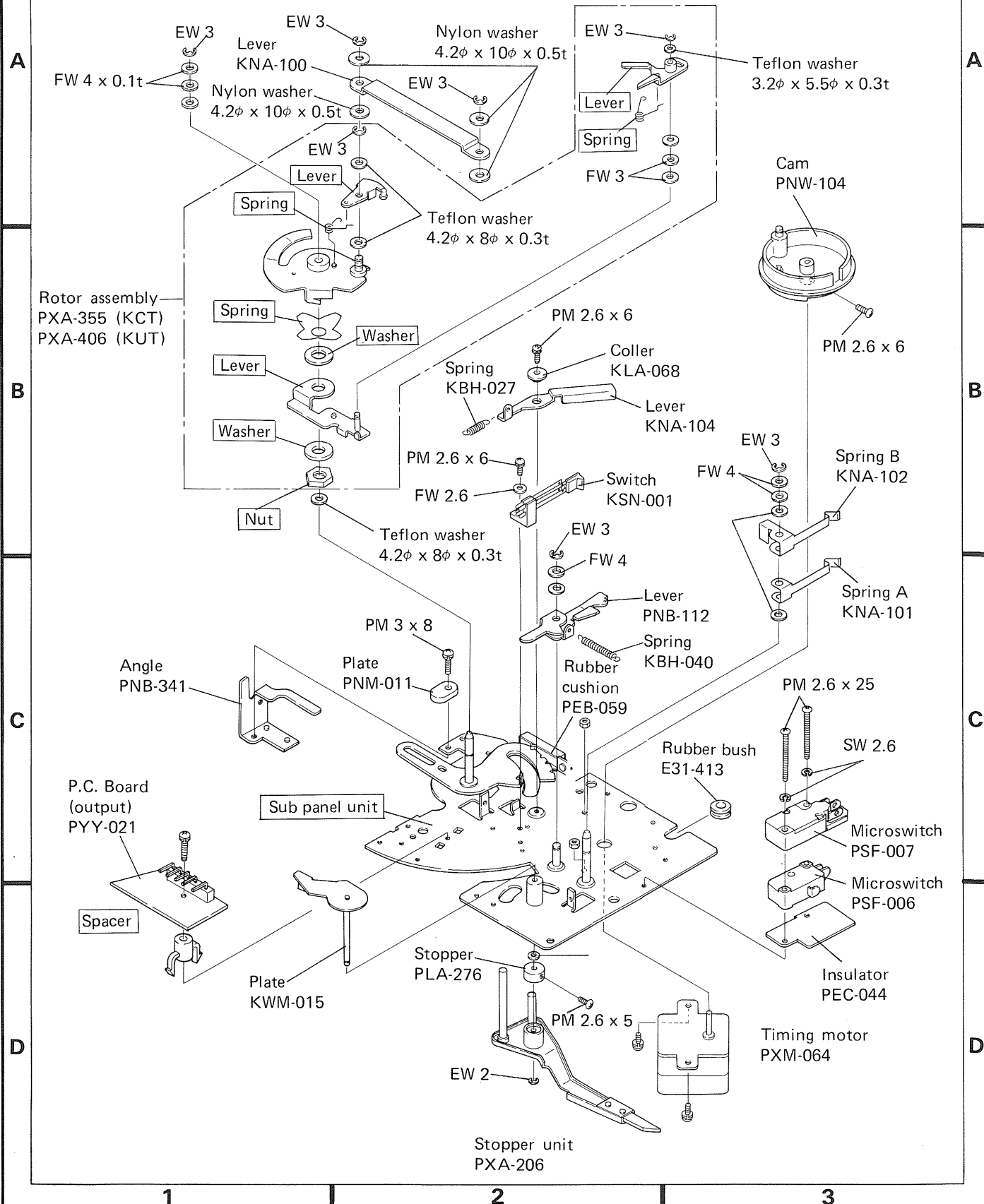
7.3 ARM BASE

NOTE:
 marked parts cannot be supplied.

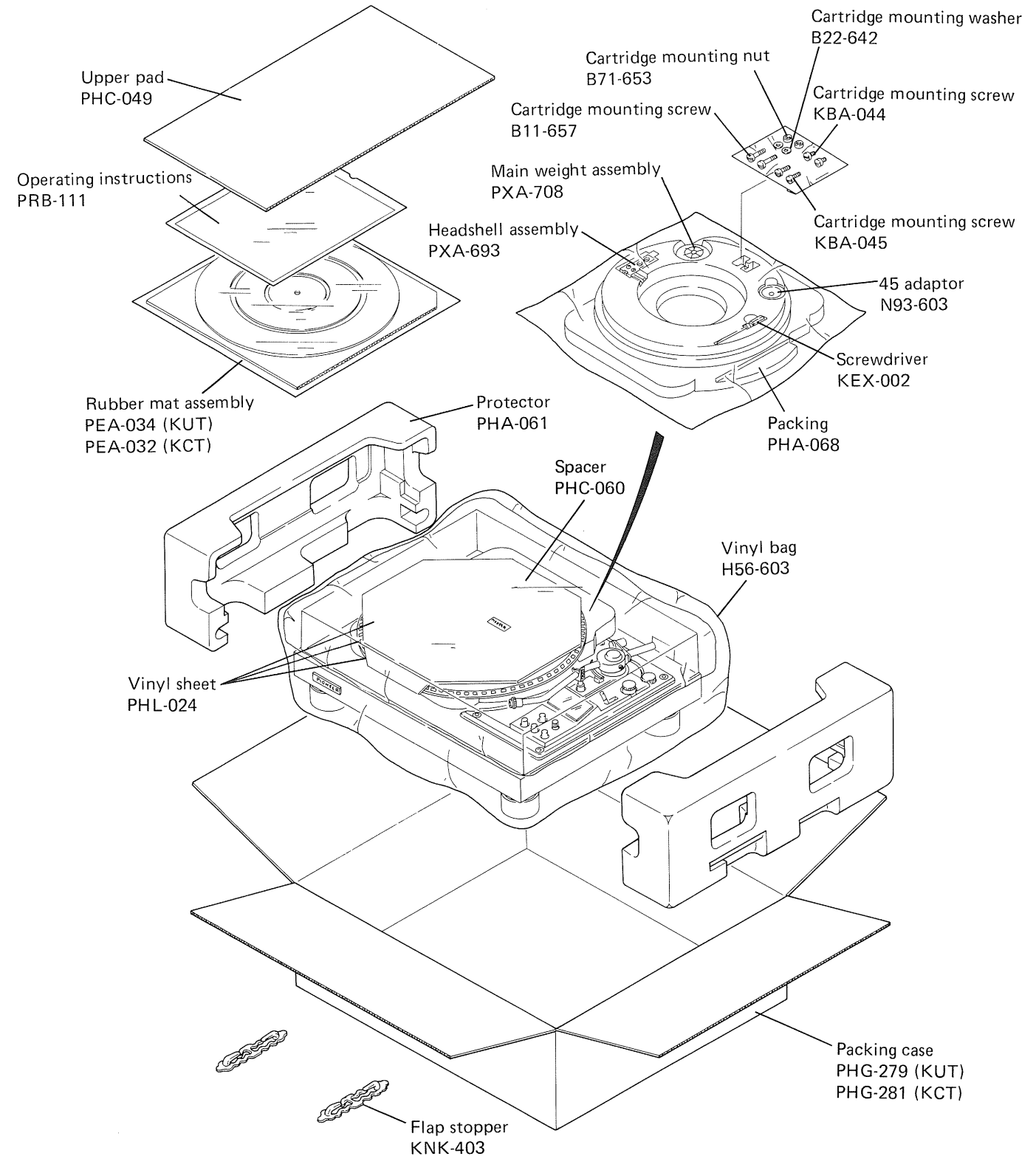


7.4 SUB PANEL

NOTE:
☐ marked parts cannot be supplied.

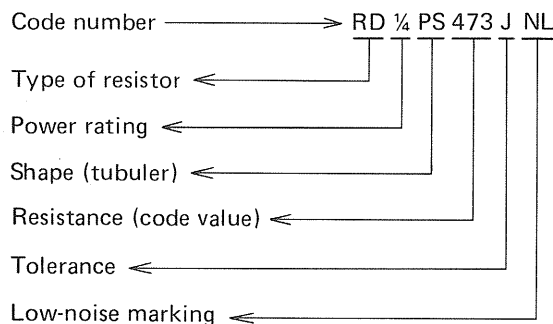


8. PACKING



RESISTANCE VALUE CODES

Code numbers of resistors used in Pioneer equipment are expressed in the following way:—



Furthermore, in the list of parts found in the Service Manual, the resistance (code value) part of the above code number is expressed as □□□ or □□□□.

Resistors included in the Service Manual list of parts

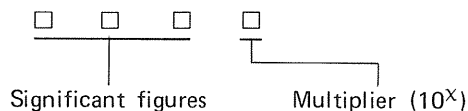
Ex. RD 1/4 PS □□□ JNL

When ordering resistor components, first ascertain the actual resistance value from the circuit diagram, and then convert it into code no. form as shown in the following examples.

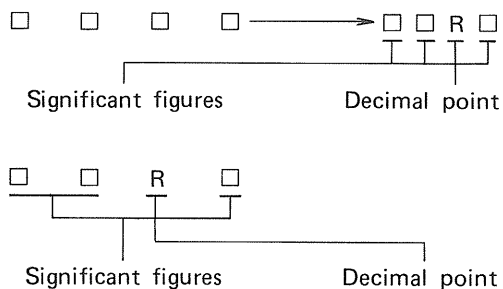
For further details on code numbers, refer to "Tuning Fork" VOL. 1.

Ex. 1 For □□□□ Codes

* General resistors



* Resistors with fractional values

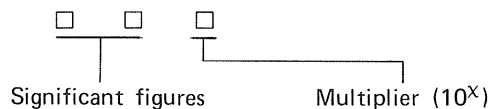


Ex. 1

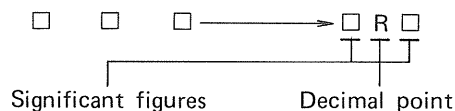
Nominal resistance (Ω)	Significant figure (three figures)	Multiplier (10 ^X)	Resistance value code
5.1	510	.....	5R10
5.62	562	.....	5R62
10	100	.....	10R0
22.5	225	.....	22R5
110	110	x10 ⁰	1100
1k (1000)	100	x10 ¹	1001
1.56k (1560)	156	x10 ¹	1561
10k (10000)	100	x10 ²	1002
33.6k (33600)	336	x10 ²	3362
112k (112000)	112	x10 ³	1123
1M (1000000)	100	x10 ⁴	1004
1.56M (1560000)	156	x10 ⁴	1564

Ex. 2 For □□□ Codes

* General resistors



* Resistors with fractional values

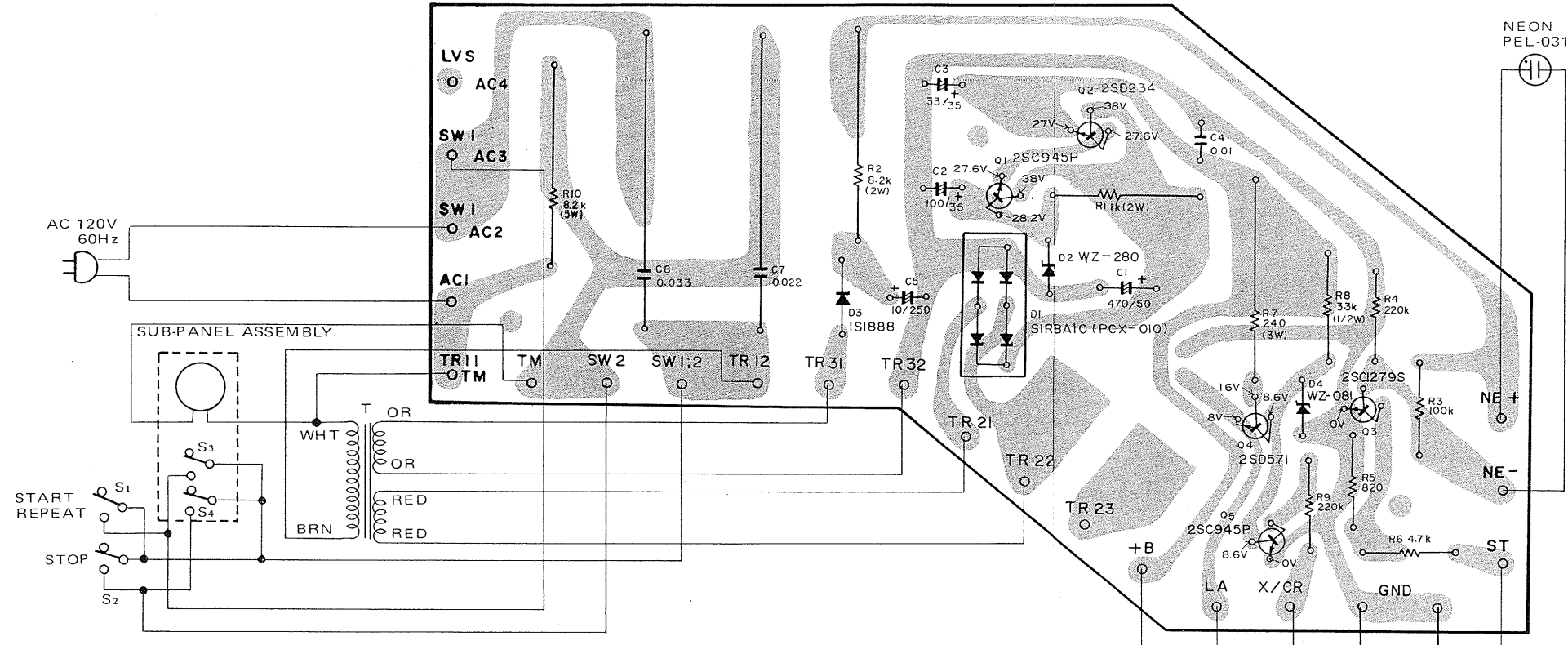


Ex. 2

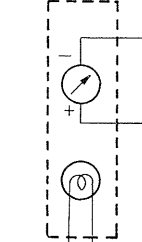
Nominal resistance (Ω)	Significant figure (two figures)	Multiplier (10 ^X)	Resistance value code
0.5	05	.....	0R5
1.5	15	.....	1R5
1	01	x10 ⁰	010
22	22	x10 ⁰	220
330	33	x10 ¹	331
1k (1000)	10	x10 ²	102
5.6k (5600)	56	x10 ³	562
68k (68000)	68	x10 ³	683
820k (820000)	82	x10 ⁴	824
1M (1000000)	10	x10 ⁵	105
2.2M (2200000)	22	x10 ⁵	225

9.2 P.C. BOARD CONNECTION DIAGRAM

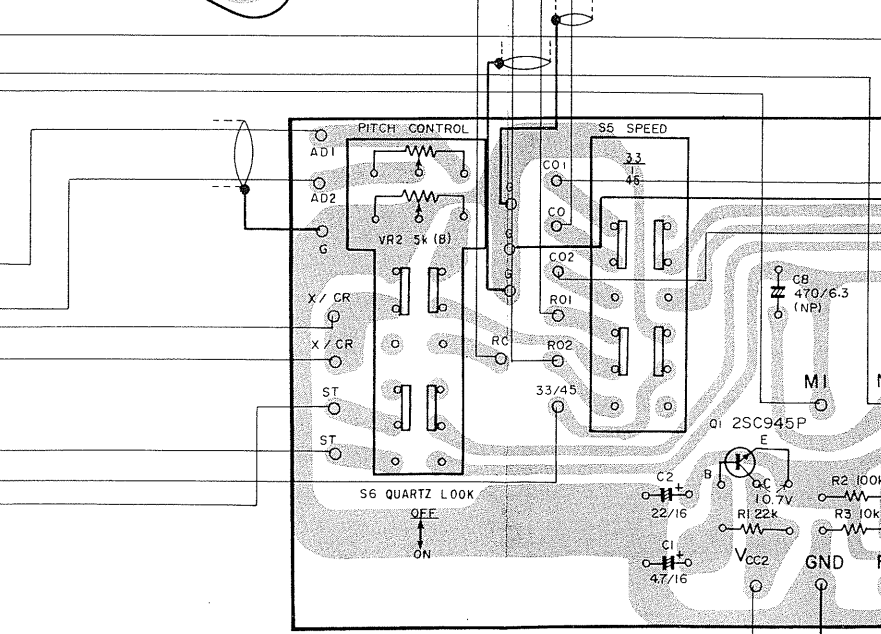
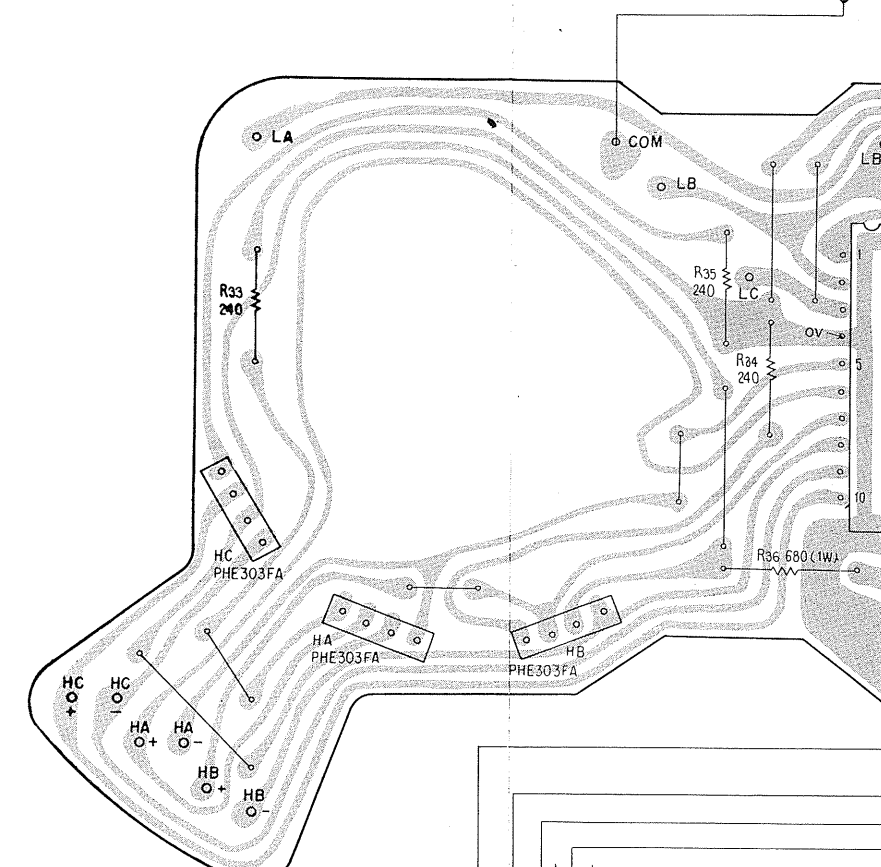
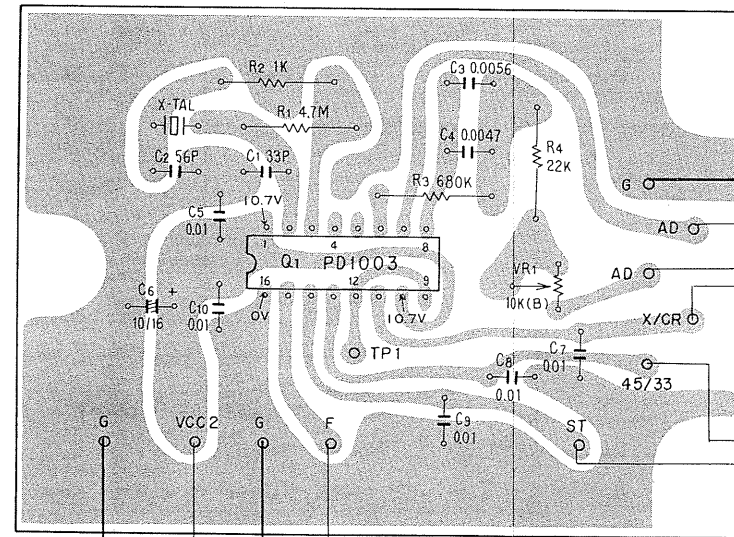
Power Supply Assembly PWR-044

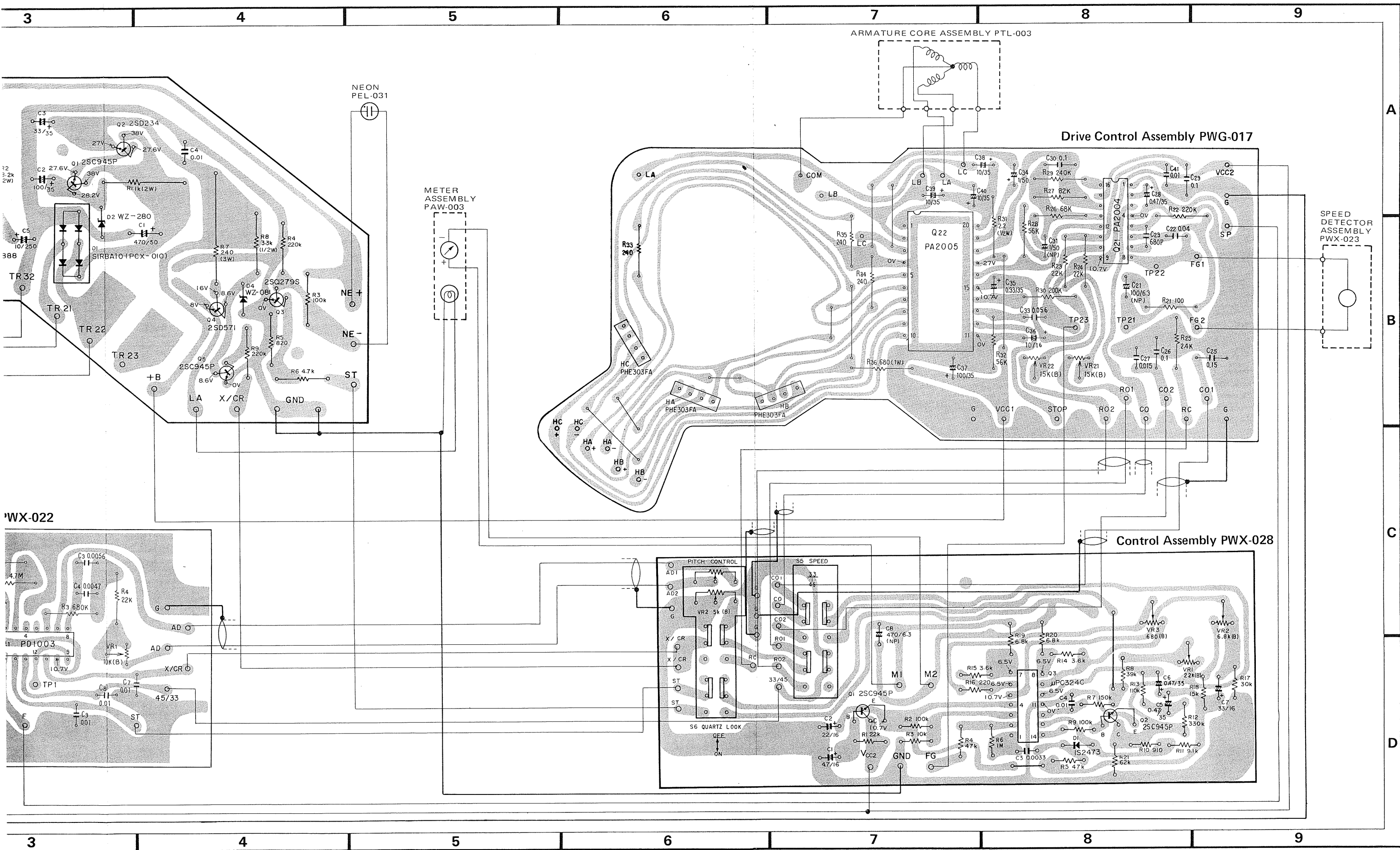


METER ASSEMBLY PAW-003

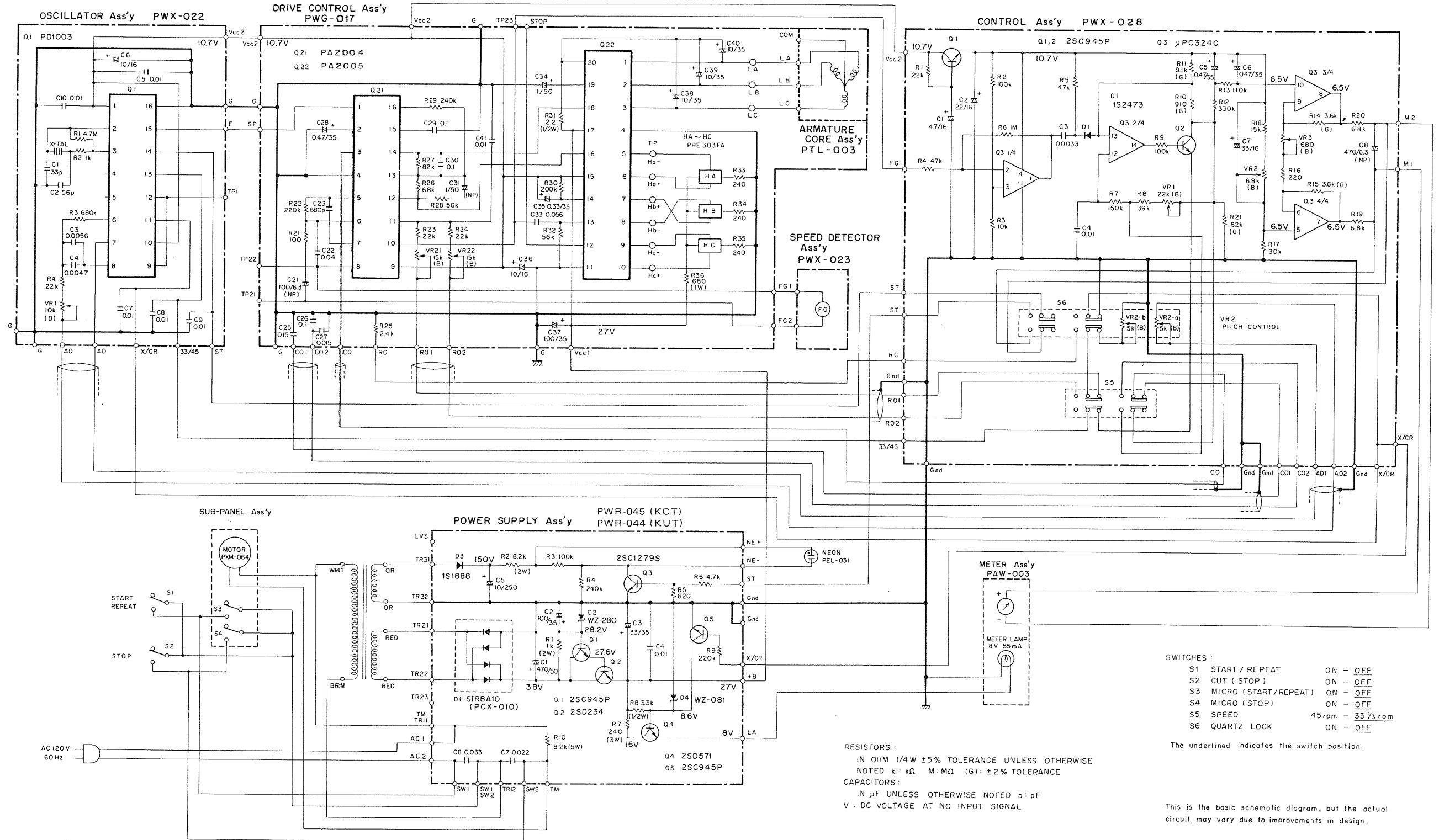


Oscillator Assembly PWX-022

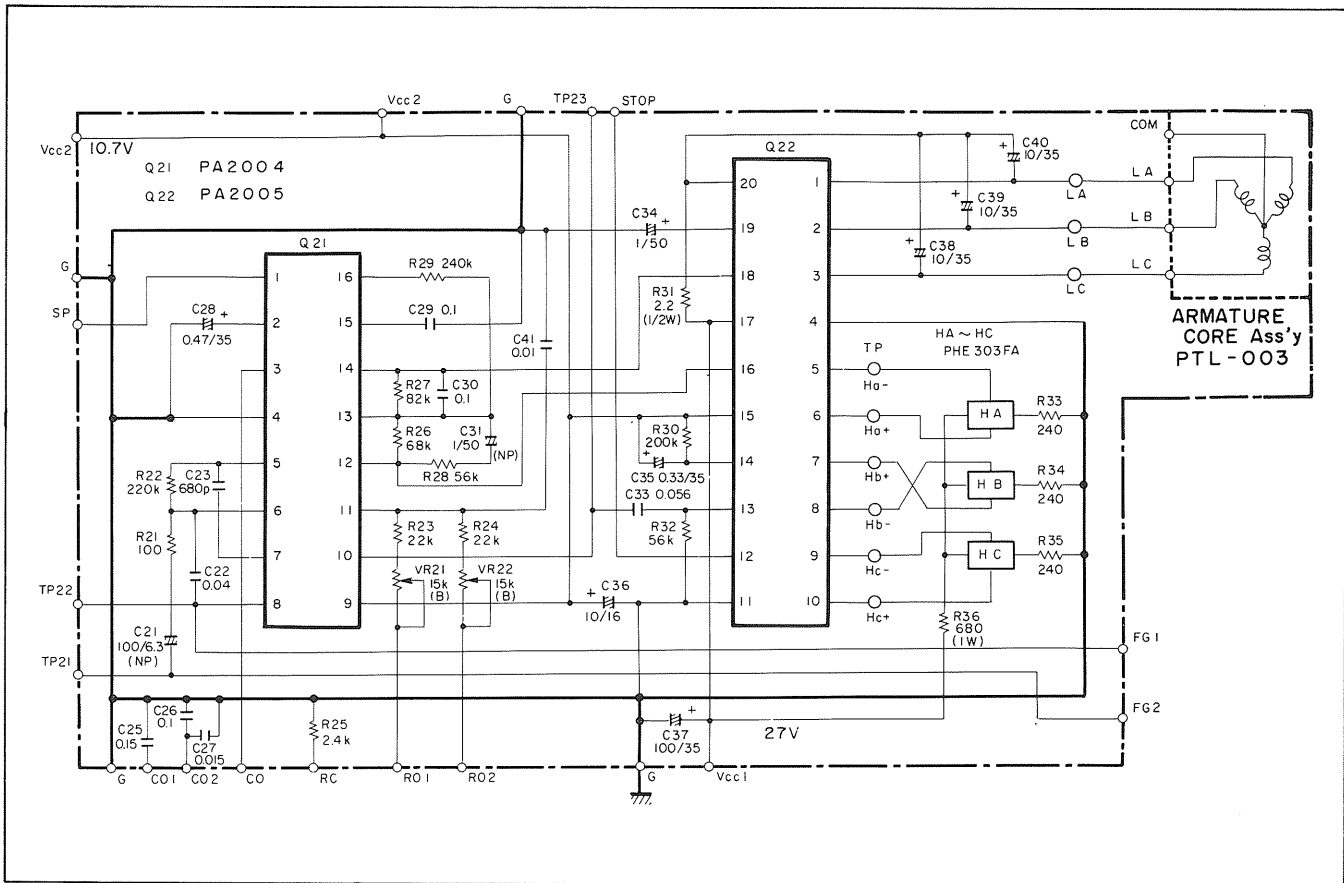




9.1 SCHEMATIC DIAGRAM



9.3 DRIVE CONTROL ASSEMBLY (PWG-017)



Part List of Drive Control Assembly (PWG-017)

CAPACITORS

Part No.	Symbol & Description
CEA 101M 6.3NP	C21
CKDYF 403Z 50	C22
CKDYB 681K 50	C23
CQMA 154J 50	C25
CQMA 104J 50	C26, C30
CQMA 153J 50	C27
CSZA R47K 35	C28
CQMA 104K 50	C29
CEA 010M 50NP	C31
CQMA 563K 50	C33
CEA 010P 50	C34
CSZA R33K 35	C35
CSZA 100K 16	C36
CEA 101P 35	C37
CEA 100P 35	C38, C39, C40
CKDYF 103Z 50	C41

RESISTORS

Part No.	Symbol & Description
PCP-019	VR21, VR22 15kΩ-B
RD¼PS □□□ J	R21–R30, R32–R35
RD¼PS □□□ J	R31
RS1P □□□ J	R36

SEMICONDUCTORS, OTHER

Part No.	Symbol & Description
PA2004	Q21
PA2005	Q22
PCX-039	HA, HB, HC Hall element (PHE303FA)
PTL-003	Armature core assembly

9.4 CONTROL ASSEMBLY (PWX-028)

The schematic diagram illustrates the internal circuitry of the PWX-028 Control Assembly. Key components include:

- Power Supplies:** A 10.7V supply (Q1) and a 6.5V supply (Q3).
- Op-Amps:** Two 741 op-amp comparators (Q3 1/4 and Q3 3/4) and a 555 timer (Q3 2/4).
- Resistors:** Various resistors (R1-R21) are used for biasing and timing.
- Capacitors:** Various capacitors (C1-C8) are used for timing and filtering.
- Pitch Control:** A potentiometer (VR2) is used for pitch control.
- Control Panel:** The circuit is connected to a control panel with buttons S5 and S6, and a pitch control potentiometer VR2.
- Output:** The output is connected to a speaker (M1) and a control panel (M2).

Parts List of Control Assembly (PWX-028)

OTHERS

Part No.	Symbol & Description
PCS-013	Push switch
PSG-012	Push switch

SEMICONDUCTORS

Part No.	Symbol & Description
2SC945P	Q1, Q2
μ PC324C	Q3
1S2473	D1

CAPACITORS

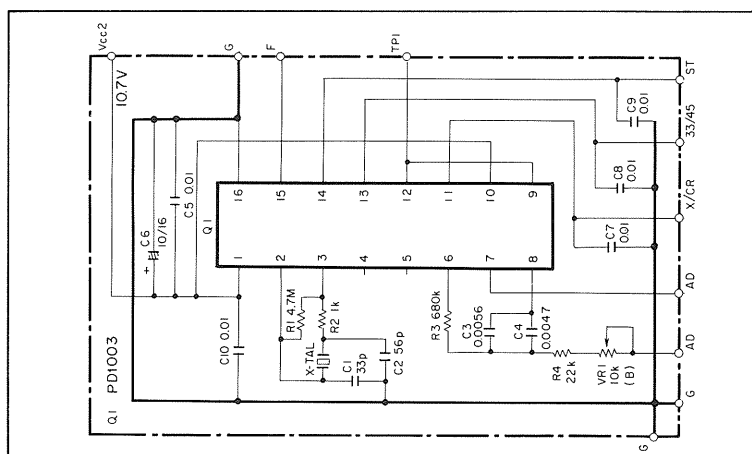
Part No.	Symbol & Description
CEA 4R7P 16	C1
CEA 220P 16	C2
CQMA 332K 50	C3
CQMA 103J 50	C4
CSZA R47M 35V	C5, C6
CSZA 330M 10	C7
CEA 471M 6.3NP	C8

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

Part No.	Symbol & Description
RD $\frac{1}{4}$ VS $\square\square\square$ J	R1-R6, R9-R20
RN $\frac{1}{4}$ PS $\square\square\square$ G	R7, R8
PCP-026	VR1
PCP-027	VR2
PCP-028	VR3

9.5 OSCILLATOR ASSEMBLY (PWX-022)



Parts List of Oscillator Assembly (PWX-022)

CAPACITORS

Part No.	Symbol & Description
CCDCH 330J 50	C1
CCDCH 560J 50	C2
CQMA 562J 50	C3
CQSH 472J 50	C4
CKDYF 103Z 50	C5, C7-C10
CEA 100P 16	C6

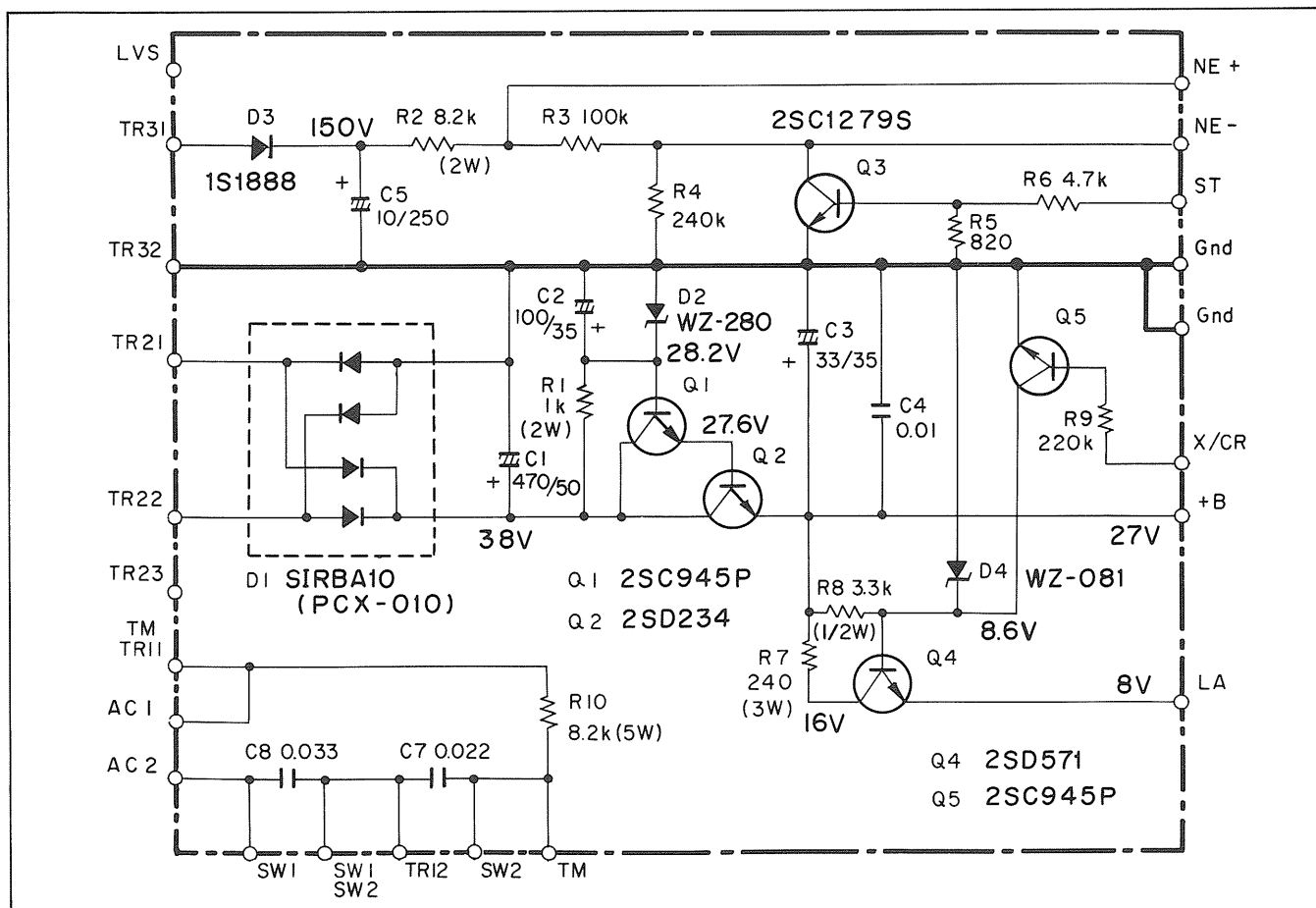
RESISTORS

Part No.	Symbol & Description
RD $\frac{1}{4}$ PS $\square\square\square$ J	R1-R3
RN $\frac{1}{4}$ PS $\square\square\square$ G	R4
PCP-015	VR1 (10k Ω -B)

OTHERS

Part No.	Symbol & Description
PD1003	IC
PSS-003	Crystal

9.6 POWER SUPPLY ASSEMBLY



Parts List of Power Supply Assembly

SEMICONDUCTORS

Part No.	Symbol & Description
2SC945P	Q1, Q5
2SD234-O	Q2
2SC1279S	Q3
2SD571	Q4
SIRBA10	D1
WZ-280	D2
1S1888	D3
WZ-081	D4

CAPACITORS

Part No.	Symbol & Description
CEA 471P 50	C1
CEA 101P 35	C2
CEA 330P 35	C3
CKDYF 103Z 50	C4
CEW 4R7P 250	C5
PCL-031	C7 (KUT)
KCE-009	C8 (KUT)
PCL-030	C7 (KCT)
PCL-018	C8 (KCT)

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

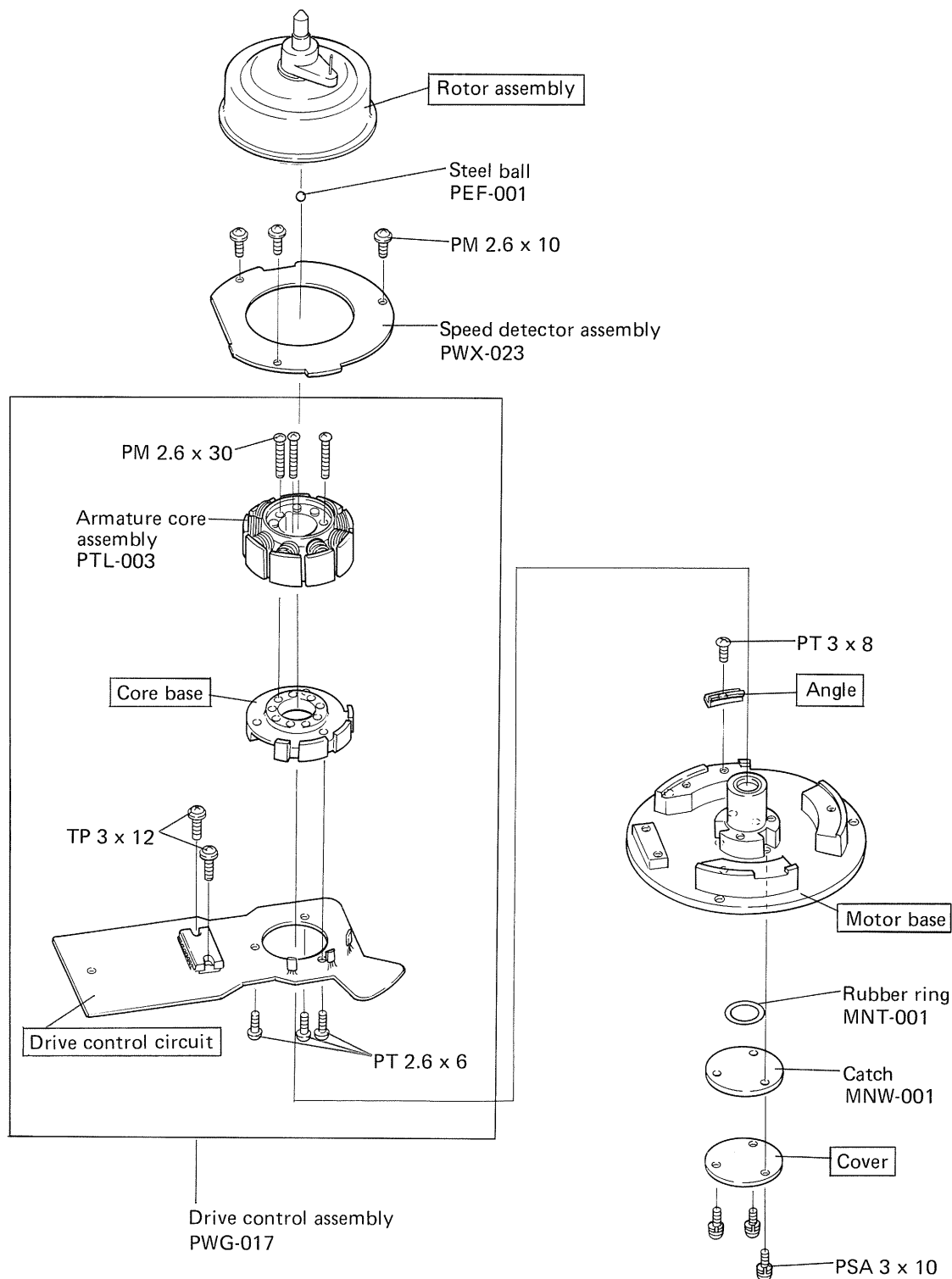
RESISTORS

Part No.	Symbol & Description
RS2P □□□ J	R1, R2
RD¼PS □□□ J	R3–R6, R9
RS3P □□□ J	R7
RD½PS □□□ J	R8
RT5B □□□ J	R10 (KUT)
RS3P □□□ J	R10 (KCT)

10. D.D.MOTOR EXPLODED VIEW

NOTE:

marked parts cannot be supplied.



NOMENCLATURE OF SCREWS, WASHERS AND NUTS

The following symbols stand for screws, washers and nuts as shown in exploded view.

Symbol	Description	Shape
RT	Brazier head tapping screw	
PT	Pan head tapping screw	
BT	Binding head tapping screw	
CT	Countersunk head tapping screw	
TT	Truss head tapping screw	
OCT	Oval countersunk head tapping screw	
PM	Pan head machine screw	
CM	Countersunk head machine screw	
OCM	Oval countersunk head machine screw	
TM	Truss head machine screw	
BM	Binding head machine screw	
PSA	Pan head screw with spring lock washer	
PSB	Pan head screw with spring lock washer and flat washer	
PSF	Pan head screw with flat washer	

Symbol	Description	Shape
EW	E type washer	
FW	Flat washer	
SW	Spring lock washer	
N	Nut	
WN	Washer faced nut	
ITW	Internal toothed lock washer	
OTW	Outernal toothed lock washer	
SC	Slotted set screw (Cone point)	
SF	Slotted set screw (Flat point)	
HS	Hexagon socket headless set screw	
OCW	Oval countersunk head wood screw	
CW	Countersunk head wood screw	
RW	Round head wood screw	

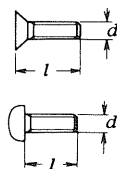
EXAMPLE

PM • 3x8

length in mm (l)

diameter in mm (d)

Symbol



FW • 9φ × 1^t

thickness in mm (t)

diameter in mm (d)

Symbol

